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⑮ 発明の名称 再剥離性を有する粘着シート及びその製造方法

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明 細 書

1. 発明の名称

再剥離性を有する粘着シート及びその製造方法

2. 特許請求の範囲

(1) 基材表面に所定厚みの粘着剤基層を設けると共に、該粘着剤基層表面から外方に突出する多数の粘着剤凸状体を、粘着剤基層と一体的に設けたことを特徴とする再剥離性を有する粘着シート。

(2) 凹部を多数有する離型フィルムの表面に、凹部に粘着剤が充填され且つその上に連続して所定厚みの粘着剤基層が形成されるように粘着剤を凹部の深さよりも厚く塗工し、次いで該粘着剤基層表面に基材を貼り合わせることを特徴とする再剥離性を有する粘着シートの製造方法。

3. 発明の詳細な説明

(産業上の利用分野)

本発明は再剥離性を有する粘着シート及びその製造方法に関する。

(従来の技術)

従来ラベル等の粘着シートにおいて、被着体に

貼着後、剥離が可能で且つ再使用できるものが広く用いられている。例えばメモ用紙や付箋として、用件や疑問等を記入して一時的に文書などに貼着し、不要になった場合に剥離して捨てる粘着シートや、被着体に貼る位置を確認するために仮貼着し、位置が違っている場合剥離して再貼着したのちに本貼着する粘着シートのような仮貼着可能な粘着シート等の再剥離性を有する粘着シートが知られている。

このような粘着シートとして、1) 粘着剤層を印刷等の方法により基材上に網点状に付着せしめ部分的に基材上に形成した粘着シート、2) 球状の粘着性微小粒子を多数個バインダーを介して基材表面に付着形成してなる粘着シート(例えば実開昭54-60661、実開昭55-42881)、3) 基材表面に半球状の粘着性微小粒子を多数個その曲面が外面に向くように付着して粘着剤層を形成した粘着シート(例えば実公昭57-57394)等が提案されている。

[発明が解決しようとする課題]

しかしながら上記1)、2)の粘着シートにおいては、被着体へ一度貼着した後に剥離する場合に、網点状の粘着剤や粘着性微小粒子が被着体側へ残存してしまい、被着体表面を粘着剤で汚してしまうという問題点があった。また3)の粘着シートにおいては粘着剤が半球状のため、基材と粘着性微小粒子の間の結合が強くなり1)、2)の場合に比べ、剥離時の粘着剤の残存という問題点をある程度改善できるが、粘着シートを製造する場合に、半球状の粘着性微小粒子を予め製造しておく必要があり、更に粘着性微小粒子を曲面を外側に向けて基材に付着させるという面倒な作業が必要となる。従って製造工程が増えるとともに、微小粒子の曲面を全て外側に向けて付着せしめることは技術的に困難であるという製造上の問題点があった。

本発明は、上記の従来技術の欠点を解消するもので、被着体からの剥離の際に被着体側に粘着剤が残存せず適切な剥離を行うことができる、再剥離性を有する粘着シート及びその製造方法を提供

凸状体5とは同一材料により一体的に設けられている。粘着剤凸状体5の水平断面形状は、点状、線状、格子状等任意であり、点状の場合は円形、楕円形、回転放物面、三角形、四角形等種々の形状のものが可能であるが、特に球状が望ましい。また突出方向の垂直断面形状は、再剥離適性上から線状、格子状のいずれの場合も突出方向に滑らかな曲面やテーパ面が形成されるものが好ましく、特に半球状が好ましい。好ましい粘着剤凸状体5の立体形状としては半球状が挙げられる。

凸状体5の大きさと数は、被着体との再剥離特性と関係する。凸状体の数が少なく密度が低いと充分な付着力が得られず、数が多く密度が高いと再剥離特性が悪くなる傾向がある。

凸状体1個の基底部の幅は通常1~300 $\mu$ mであり、例えば半球状の形状の場合1~50 $\mu$ m程度の直径が好ましい、また凸状体の高さは1~300 $\mu$ mである。凸状体の数は、その寸法によっても異なるが、直径1~50 $\mu$ mの半球状の場合、1000~1000000個/cm<sup>2</sup>程度に通常

することを目的とする。

(課題を解決するための手段)

本発明は、

- (1) 基材表面に所定厚みの粘着剤基層を設けると共に、該粘着剤基層表面から外方に突出する多数の粘着剤凸状体を、粘着剤基層と一体的に設けたことを特徴とする再剥離性を有する粘着シート。
  - (2) 凹部を多数有する離型フィルムの表面に、凹部に粘着剤が充填され且つその上に連続して所定厚みの粘着剤基層が形成されるように粘着剤を凹部の深さよりも厚く塗工し、次いで該粘着剤基層表面に基材を貼り合わせることを特徴とする再剥離性を有する粘着シートの製造方法。
- を要旨とするものである。

以下本発明を図面に基き詳しく説明する。

第1図に示すように、本発明の粘着シート1は、基材2と該基材2の表面に形成した粘着剤層3から成り、粘着剤層3は所定厚みに設けた粘着剤基層4と外方に突出するように設けた多数の粘着剤凸状体5により形成され、粘着剤基層4と粘着剤

形成される。

本発明の粘着シートは粘着剤凸状体の形状、寸法、密度及び粘着剤の種類等を選択することにより、被着体の種類に応じて再剥離性を最適に調節することができる。

粘着剤凸状部5と一体的に形成される粘着剤基層3の厚みは、粘着剤凸状体5の大きさにもよるが、通常1~100 $\mu$ mであり、好ましくは10~50 $\mu$ mである。

粘着剤層3は基材2の表面全面に設けても、部分的に設けてもよい。

粘着剤層3を形成する粘着剤としては、従来公知の粘着テープやシール類に使用されている一般のアクリル系、ゴム系の粘着剤が用いられ、溶剤系、エマルジョン系の粘着剤が何れも使用できる。例えば、ポリイソブレンゴム、ポリイソブチレンゴム、スチレンブタジエンゴム、ブタジエンアクリロニトリルゴム等のゴム系樹脂、(メタ)アクリル酸エステル系樹脂、ポリビニルエーテル系樹脂、ポリ酢酸ビニル系樹脂、塩化ビニル酢酸ビニ

ル共重合体系樹脂、ポリスチレン系樹脂、ポリエステル系樹脂、ポリアミド系樹脂、ポリ塩素化オレフィン系樹脂、ポリビニルブチラール系樹脂等の任意の接着剤に、適当な粘着付与剤、例えば、ロジン、ダンマル、重合ロジン、部分水添ロジン、エステルロジン、ポリテルペン系樹脂、テルペン変性体、石油系樹脂、シクロペンタジエン系樹脂、フェノール系樹脂、スチレン系樹脂、キシレン系樹脂、クマロンインデン系樹脂等を適量添加したものが挙げられ、さらに必要に応じて軟化剤、充填剤、老化防止剤等も添加することができる。

基材2は、通常粘着シートの基材として使用できるものであればいずれでもよく、例えばアルミニウム、銅、鉄等の金属箔、ポリエチレンテレフタレート、ポリブチレンテレフタレート、ポリエチレンテレフタレート/イソフタレート共重合体等のポリエステル樹脂、ポリエチレン、ポリプロピレン、ポリメチルペンテン等のポリオレフィン樹脂、ポリフッ化ビニル、ポリフッ化ビニリデン、ポリ4フッ化エチレン、エチレン-4フッ化エチ

レン共重合体、等のポリフッ化エチレン系樹脂、ナイロン6、ナイロン6.6等のポリアミド、ポリ塩化ビニル、塩化ビニル/酢酸ビニル共重合体、エチレン/酢酸ビニル共重合体、エチレン/ビニルアルコール共重合体、ポリビニルアルコール、ビニロン等のビニル重合体、三酢酸セルロース、セロファン等のセルロース系樹脂、ポリメタクリル酸メチル、ポリメタクリル酸エチル、ポリアクリル酸エチル、ポリアクリル酸ブチル等のアクリル系樹脂、ポリスチレン、ポリカーボネート、ポリアリレート、ポリアミド等の合成樹脂フィルム又はシートの単層体又は複数層の積層体、或いは、上質紙、薄葉紙、グラシン紙、硫酸紙等の紙、硝子繊維、天然繊維、合成繊維等の1種又は2種以上からなる布、不織布等が挙げられる。

基材2の厚みは特に限定されないが、通常12~200 $\mu$ m程度のものが用いられる。また基材2と粘着剤層3の接着性を上げるために必要に応じ、基材2表面にコロナ放電処理、プラズマ処理、プライマーコート、脱脂処理、表面粗面化処理等

公知の易接着処理を施してもよい。

本発明の粘着シートはその用途に応じ、筆記特性を付与するための処理を施すことができる。例えば第2図に示すように、基材2の粘着剤層形成面とは反対側の面を筆記面6とすると、該筆記面6の表面を公知の方法で処理して筆記部7を形成してもよい。

筆記部7を形成する方法として例えば、微小粒子を含有する樹脂を塗布する方法、微小粒子を含有した形で基材を作成する方法、基材表面をサンドブラスト等の既知の方法にて粗面化する等の方法が挙げられる。

また必要に応じ、基材2の片面又は両面に絵柄、金属薄膜等からなる装飾層8を全面又は部分的に印刷、蒸着等の方法で設けることができる。

第2図に示すように本発明粘着シート1は、粘着剤凸状体5が粘着剤基層4と一体になっているために、基材2に強く付着し、基材2への固定力が強い。その結果、本発明粘着シートを被着体9に貼着後、剥離する際に凸状体5が基材2から脱

離して被着体9表面に残存するという虞れがなく良好な剥離を行うことができる。

次に本発明の粘着シートの製造方法について説明する。第3図(a)に示すように、多数の凹部10を形成してなる離型フィルム11を用意し、この離型フィルム11の表面に、同図(b)に示すように粘着剤を凹部10の深さよりも厚く塗工する。即ち、粘着剤が凹部10を完全に埋め尽くすと共に、その上に連続して所定厚みの粘着剤層が形成されるように塗工する。次いで同図(c)に示すように粘着剤層3の表面に基材2を貼り合わせ、再剥離性を有する粘着シート1を得る。

上記工程において、凹部10に充填された粘着剤が粘着剤凸状体5を形成し、その上に連続的に所定厚みをもって塗工された粘着剤が粘着剤基層4を形成する。

離型フィルム11の凹部10の形状としては、上記粘着剤凸状体5の形状に対応したものを使用すればよく、離型フィルム11に凹部10を形成する方法としては、従来公知の熱圧エンボス加工

等が挙げられる。

離型フィルム11の材質は、離型フィルム11と粘着剤層3の間の接着力が基材2と粘着剤層3の間の接着力よりも小さいものであれば材質は特に限定されない。

離型フィルムの材質としては、ポリエチレンテレフタレート、ポリブチレンテレフタレート、ポリエチレンテレフタレート/イソフタレート共重合体等のポリエステル樹脂、ポリエチレン、ポリプロピレン、ポリメチルペンテン等のポリオレフィン樹脂、ポリフッ化ビニル、ポリフッ化ビニリデン、ポリ4フッ化エチレン、エチレン-4フッ化エチレン共重合体等のポリフッ化エチレン系樹脂、ナイロン6、ナイロン6.6等のポリアミド、ポリ塩化ビニル、塩化ビニル/酢酸ビニル共重合体、エチレン/酢酸ビニル共重合体、エチレン/ビニルアルコール共重合体、ポリビニルアルコール、ビニロン等のビニル重合体、三酢酸セルロース、セロファン等のセルロース系樹脂、ポリメタクリル酸メチル、ポリメタクリル酸エチル、

官能のアクリレート、ポリエステル、エポキシ、チタンキレート、ポリイミン等の樹脂を離型フィルム面に塗工して該樹脂の皮膜を形成するか又は上記の樹脂をエクストルージョンコートなどで離型フィルム上にラミネートして、離型層を0.1~1 $\mu$ m程度の厚さに離型フィルムに形成する方法が挙げられる。

粘着剤の離型フィルム11への塗工方法は特に限定されず、例えばロールコーティング、ダイコーティング、グラビアコーティング、コンマコート等慣用のコーティング方法により、粘着剤層を形成することができる。なかでもコンマコートのような後計量法の方が、塗工面の平滑性に優れ好ましい。

本発明の粘着シートは単票でも連続したロール状のいずれの形態でも製造することができる。

連続したロール状で粘着シートを製造する場合、粘着材を離型フィルムに塗布し基材を貼り合わせた後、離型フィルムを剥離せずにそのままロール状に巻き取る方法や、基材の裏面上に公知の材料、

ポリアクリル酸エチル、ポリアクリル酸ブチル等のアクリル系樹脂、ポリスチレン、ポリカーボネート、ポリアリレート、ホリイミド等の合成樹脂フィルム又はシートの単層体又はそれらの複数の積層体、或いは上質紙、薄葉紙、グラシン紙、硫酸紙等の紙が挙げられる。

また離型フィルム11と粘着剤層3の離型を容易にするために、離型処理を施すことができる。離型処理は離型フィルム11に凹部10を設ける前に行っても、凹部10を設けた後に行ってもよい。

離型処理としては、例えば弗素系樹脂、パラフィンワックス、モンタンワックス、合成ワックス等のワックス類や、シリコン等の離型剤を公知のベヒクル例えば、アクリル系樹脂、縮醛系樹脂、ビニル系樹脂等に添加してなる塗料を離型フィルム面に塗布して該塗料の塗膜を形成したり、離型性の樹脂例えば、弗素系樹脂、シリコン、ポリシロキサン、メラミン系樹脂、ウレタン系樹脂、ポリオレフィン樹脂、電離放射線架橋型の多

方法等で離型処理を施し、離型フィルムを剥離して粘着シートをロール状に巻き取る方法のどちらでもよい。

離型フィルムを剥離してロール状に巻き取られた粘着シートは、使用時に離型フィルムを剥離する手間を省くことができる。

#### 〔作用〕

本発明粘着シート1は粘着剤層3に多数の粘着剤凸状体5を有するために、被着体9に貼着した場合、粘着剤層3と被着体9の間の接触面積が小さくなり、粘着シート1の接着力が適当に低下し、被着体9からの剥離が容易に行える。

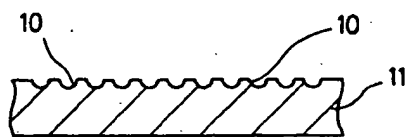
また粘着剤凸状体5を粘着剤基層4表面から外方に突出するように設けたことにより、粘着シートを軽い押圧により粘着剤凸状体5のみを被着体9に付着させることにより仮接着し、更に強く押圧して粘着剤基層4まで被着体に付着させることにより本接着することができる。

更に粘着剤凸状体5と粘着剤基層4が一体に形成されて粘着剤層3を形成しているために、粘着

出 2 区

第 3 図

(a)

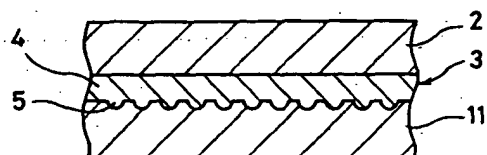


10...凹部  
11...離型フィルム

(b)



(c)



(19) Patent Office of Japan (JP) (11) Publication of Patent Application

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(54) Name of the invention: Removable Adhesive Sheet and Its Manufacturing method

(21) Filed Number: Hei-Sei 2-38574

(22) Filed date: Hei-Sei 2 (1990) 2/20

Patent Assignee: Dainippon Printing Company

*Adhesive*

**JP 3-243677**

*[Note: Names, addresses, Company names and brand names are translated in the most common manner. Japanese language does not have singular or plural words unless otherwise specified with numeral prefix or general form of plurality suffix. Translator's note.]*

## **Description of the invention**

### **1. Name of the invention**

**Removable Adhesive Sheet and Its Manufacturing Method**

### **2. Range of the claims of the invention**

(1) Removable adhesive sheet, characterized by the fact that on the front surface of a substrate plate an adhesive agent layer with a predetermined thickness is provided and together with that a large number of adhesive agent protrude shape bodies that are protruding in the outer direction from the front surface of the above adhesive agent base layer, are provided as one body with the adhesive agent base layer.

(2) Manufacturing method for the preparation of removable adhesive sheet, characterized by the fact that on the front surface of a release film that has a large number of indentations, an adhesive agent is coated thicker than the depth of the above described indentations, so that in these indentations an adhesive agent is filled and also, on the surface of that, continuously, an adhesive agent base layer with a predetermined thickness is formed, and then after that, on the front surface of the above described adhesive agent base layer, the substrate material is glued.

### **3. Detailed explanation of the invention**

#### **[Technological sphere of application]**

The present invention is an invention about an adhesive sheet that has removable properties, and it is an invention about its manufacturing method.



### **[Previous technology]**

In the past as the adhesive sheet used in labels, etc., the material has been widely used that can be removed after the adhesion onto the body that has been subjected to the adhesion, and also, it can then be used again. For example, as the paper used for memo, or discussions, the adhesive sheets that have removable properties have been known, like the adhesive sheets where the use conditions or the problem etc., is temporarily recorded and it is adhered onto the reference material, etc., and in the case when it is not necessary any more, it is separated and thrown away, or the temporary adhesion adhesive sheets where in order to confirm the adhesion position on the material that is the subject of the adhesion, it is temporarily adhered, and in the case when the position is erroneous it is removed and it is then adhered again, and then after that it is really adhered.

As such adhesive sheets, 1) the adhesive sheet where an adhesive agent layer is partially formed on the substrate material, as it is adhered in a network type of pattern by using a printing type method etc., 2) the adhesive sheet where spherically shaped adhesive fine particles are adhered onto the substrate plate on numerous position through the use of a binder material, (for example, the Japanese Patent Application Laid Open Number Showa 54-60661, Japanese Patent Application Laid Open Number Showa 55-42881), 3) the adhesive sheet where on the front surface of the substrate material semi-spherical shape fine particles are adhered on numerous positions so that their curved surface is towards the outside direction, and by that an adhesive agent layer is formed (for example Japanese Patent Report Laid Open Number Showa 57-57394) etc., have been suggested.

### **[Problems solved by the present invention]**

However, in the case of the above described 1) and 2) adhesive sheets, in the case when they have been adhered onto the material subjected to the adhesion and after that they are removed and separated, the lattice (network) shaped adhesive agent layer or the adhesive fine particles remain on the side of the material that has been subjected to the adhesion, and because of that there has been the problem that the front surface of the material that has been subjected to the adhesion is soiled. Also, in the case of the adhesive sheet 3), because the adhesive agent has a semi-spherical type of shape, the bonding between the substrate material and the adhesive fine particles, becomes strong, and compared to the cases according to 1) and 2), it is possible to improve to a certain degree the problem of the remaining of the adhesive agent at the time of the separation, however, in the case of the manufacturing of the adhesive sheet, it becomes necessary to manufacture in advance the semi-spherically shaped fine adhesive particles, and especially, a complicated technological operation becomes necessary, whereby it is said that the adhesive fine particles are adhered onto the substrate material so that their curved surface is oriented towards the outer direction. Consequently, there has been the problem that the number of the manufacturing technological processes is increased

and together with that there has been the problem that in manufacturing it is said to be technologically difficult to adhere the adhesive fine particles so that their curved surfaces are totally oriented towards the outer direction.

In the case of the present invention, it is an invention that has as a goal to suggest a removable adhesive sheet where the above described drawbacks of the previous technology are resolved, and because of that, it is a material where it is possible to conduct an appropriate separation where at the time of the separation from the material that has been subjected to the adhesion, there is no adhesive agent remaining on the side of the material that has been subjected to the adhesion. And it is also an invention that has as a goal to suggest the manufacturing method for the preparation of this removable adhesive sheet.

#### [Measures in order to solve the problems]

The present invention is an invention that has the following essential components:

(1) Removable adhesive sheet, characterized by the fact that on the front surface of a substrate plate an adhesive agent layer with a predetermined thickness is provided and together with that a large number of adhesive agent protrude shape bodies that are protruding in the outer direction from the front surface of the above adhesive agent base layer, are provided as one body with the adhesive agent base layer.

(2) Manufacturing method for the preparation of removable adhesive sheet, characterized by the fact that on the front surface of a release film that has a large number of indentations, an adhesive agent is coated thicker than the depth of the above described indentations, so that in these indentations an adhesive agent is filled and also, on the surface of that, continuously, an adhesive agent base layer with a predetermined thickness is formed, and then after that, on the front surface of the above described adhesive agent base layer, the substrate material is glued.

Here below, the present invention will be explained in further detail based on the attached diagrams.

As it is shown according to Figure 1, The adhesive sheet 1 according to the present invention is formed from the substrate material 2 and the adhesive agent layer 3, that is formed on the front surface of the above described substrate material 2, and the adhesive agent layer 3 is formed from the adhesive agent base layer 4, that is provided at a predetermined thickness, and the large number of protruded shape bodies 5 of the adhesive agent, that are provided so that they are protruding in the outer direction, and the adhesive agent base layer 4 and the adhesive agent protruded shape bodies 5, are provided as one body from the same material. Regarding the horizontal cross sectional surface shape of the adhesive agent protruded bodies 5, it can be any of a point type shape, a linear shape, a lattice shape. And in the case of the point type shape, it is possible to be a circular shape, an oval

shape, a rotation parabola shape, a triangular shape, a square shape, etc., different types of shapes, however, especially the spherical type shape is preferred.

Also, regarding the vertical cross sectional surface shape in the protrusion direction, from the point of view of the properties appropriate for the repeated removal, the case is preferred where for any of the lattice shapes, in the direction of the protrusion, a smooth curved surface or a tapered surface, is formed, and especially, a semi-circular shape is preferred. As the preferred adhesive agent protruded bodies 5 three-dimensional shape, the semi-spherical shape is used.

Regarding the size and the number of the protruded bodies 5, it is in correlation to the material that is the subject of the adhesion and the removability properties. There are the trends that when the number of the protruded bodies is small and their density is low, sufficient adhesive force is not obtained, and also, in the case when the number is large and the density is high, the removability properties become poor.

Regarding the width of the bottom base part of 1 protruded body, usually, it is in the range of 1 ~ 300 microns, and for example, in the case of a semi-spherical type of shape, it is preferred that the diameter is in the range of 1 ~ 50 microns. Also, the height of the protruded bodies is in the range of 1 ~ 300 microns. Regarding the number of the protruded bodies, although it varies depending on their dimension, in the case of a semi-spherical shape when the diameter is in the range of 1 ~ 50 microns, these are usually formed at the extent of 1000 ~ 1,000,000 units/cm<sup>2</sup>.

In the case of the adhesive sheet according to the present invention, it is a material where by the selection of the shape, the dimensions, the density and the type of the adhesive agent of the adhesive agent protruded bodies, it is possible to most appropriately control the repeated removability properties depending on the material that is the subject of the adhesion.

Regarding the thickness of the adhesive agent base layer 3 that is formed as one body together with the adhesive agent protruded parts 5, although it also depends on the size of the adhesive agent protruded bodies 5, usually, it is in the range of 1 ~ 100 microns, and preferably, it is in the range of 10 ~ 50 microns.

It is a good option if the adhesive agent base layer 3 is provided over the whole surface of the substrate material 2, and it is also a good option if it is provided partially on part of that surface.

As the adhesive agent that forms the adhesive agent layer 3, it is possible to use the usual acrylic type or rubber type adhesive agents, that have been used in the well know from the past adhesive tapes and seals, and it is possible to use a solvent type or an emulsion type adhesive agent. For example, it is possible to use materials where to any of the adhesive agents like polyisoprene rubber, polyisobutylene

rubber, styrene butadiene rubber, butadiene - acrylonitrile rubber, etc., rubber type resins, (meth)acrylic acid ester type resins, polyvinyl ether type resins, polyvinyl acetate type resins, vinyl chloride - vinyl acetate copolymer type resins, polystyrene type resins, polyester type resins, polyamide type resins, polychlorinated olefin type resins, polyvinyl styral type resins, etc., the appropriate amount of adhesion imparting agents, for example, rosine, danmaru, polymerized rosine, partially hydrogenated rosine, esterified rosine, polyterpenic type resin, terpene modified materials, petrol type resins, cyclopentadiene type resins, phenol type resins, styrene type resins, xylene type resins, cumarindene type resins, etc., has been added. And then depending on the requirements, it is also possible to use materials where a softening agent, filler agent, anti-aging agent, etc., are also added.

Regarding the substrate material 2, it is a good option if it is a material that can be used as a substrate material for the usual adhesive sheet materials, and for example, it is possible to use the following here below materials: aluminium, copper, iron etc., metal foil, polyethylene terephthalate, polybutylene terephthalate, polyethylene terephthalate / isophthalate copolymers, etc., polyester resins, polyethylene, polypropylene, polymethyl pentene, etc., polyolefin type resins, polyfluorinated vinyl, polyfluorinated vinylidene, poly 4- fluorinated ethylene, ethylene - 4 fluorinated ethylene copolymer material, etc., polyfluorinated ethylene type resins, Nylon 6, Nylon 6, 6 etc., polyamides, polychlorinated vinyl, chlorinated vinyl/ vinyl acetate copolymer materials, ethylene / vinyl acetate copolymer materials, ethylene / vinyl alcohol copolymer materials, polyvinyl alcohol, Vinyon, etc., vinyl type polymer materials, triacetate cellulose, cellophane etc., cellulose type resin materials, poly methyl methacrylate, polyethyl methacrylate, polyethyl acrylate, polybutyl acrylate, etc., acrylic type resins, polystyrene, polycarbonate, polyallylate, polyimide etc., synthetic resin films, or sheets, that can be a single layer materials or laminated layer materials, or it is possible to use top quality paper, thin leaf paper, gurashin paper, sulfuric acid paper, etc., papers, fabric material or non woven fabric material, that is obtained from one type or two and more types of glass fiber, natural fibers, synthetic fibers, etc.

There are no specific limitations regarding the thickness of the substrate material 2, however, usually, a material that has a thickness in the range of 12 ~ 200 microns, is used. Also, if it is necessary to increase the adhesive properties between the substrate material 2 and the adhesive agent layer 3, it is also a good option if the well known ease of adhesion treatments, like a corona electrical discharge treatment, plasma treatment, primer coating, de-oiling treatment, surface roughening treatment, etc., is conducted on the front surface of the substrate material 2.

In the case of the adhesive sheet according to the present invention, it is a material where, depending on its application sphere, it is possible to conduct the treatments in order to impart writing properties. For example, as it is shown according to Figure 2, if the surface of the substrate material 2, that is opposite to the surface where the adhesive agent layer has been formed, is used as the writing surface 6, it is also a

good option if the front surface of the above described writing surface 6 is treated by using the well known methods and by that the writing part 7 is formed.

As the method for the formation of the writing part 7, for example, there are the following here below methods: the method where fine particles containing resin is coated, the method where a substrate material is produced that contains fine particles, the method where on the surface of the substrate material sand blasting is applied, etc., already known methods where the surface is roughened, etc.

Also, depending on the requirements, it is possible that on one side or on both sides of the substrate material 2, a decorative layer 8, that is formed from a design, a thin metal film etc., is provided on the whole surface or on part of the surface by using the printing method, the vapor deposition method, etc.

As it is shown according to Figure 2, in the case of the adhesive sheet 1 according to the present invention, the adhesive agent protruded bodies 5 are unified as one body with the adhesive agent base layer 4, and because of that, they are strongly adhered onto the substrate material 2, and the fixing force relative to the substrate material 2, is strong. As a result from that, at the time when the adhesive sheet according to the present invention that has been glued onto the material 9 that is subjected to the adhesion, is then separated, the problem where it is said that the protruded bodies 5 are removed from the substrate material 2 and remain on the surface of the material 9, that has been subjected to the adhesion, does not exist, and it is an adhesive sheet material where it is possible to conduct a good separation.

After that, an explanation will be given regarding the manufacturing method for the preparation of the adhesive sheet according to the present invention. As it is shown according to Figure 3 (a), a release type film 11, that is formed as a large number of indented parts 10 is provided, is used, and on the front surface of this release type film, as it is shown in (b) of the same figure, the adhesive agent is coated thicker than the depth of the indented parts 10. Namely, the adhesive agent completely fills the indented parts 10, and together with that on the surface of that, continuously, an adhesive agent layer with a predetermined thickness is formed. After that, as it is shown in (c) of the same figure, on the front surface of the adhesive agent layer 3, the substrate material 2 is glued, and by that the removable adhesive sheet 1 is obtained.

According to the above described technological process, the adhesive agent that is filled into the indented parts 10 forms the adhesive agent indented bodies 5, and on the top of that, continuously, the coated so that it has a predetermined thickness adhesive agent forms the adhesive agent base layer 4.

As the shape of the indented parts 10 of the release type film 11, it is a good option as long as it is shape that corresponds to the shape of the above described adhesive agent protruded bodies 5. And as the method for the formation of the indented parts

10 in the release type film material 11, it is possible to use the well known from the previous technology, heat - pressure embossing processing etc.

Regarding the material of the release type film material 11, as long as it is a material where the adhesive force in the space between the release type film 11 and the adhesive agent layer 3, is smaller than the adhesive force in the space between the substrate material 2 and the adhesive agent layer 3, there are no specific limitations.

As the material used for the release type film material, it is possible to use the following here below materials: polyethylene terephthalate, polybutylene terephthalate, polyethylene terephthalate/ isophthalate copolymer material, etc., polyester resins, polyethylene, polypropylene, polymethyl pentene, etc., polyolefin type resins, polyfluorinated vinyl, polyfluorinated vinylidene, poly 4 fluorinated ethylene, ethylene - 4 fluorinated ethylene copolymer materials, etc., polyfluorinated ethylene type resins, Nylon 6, Nylon 6,6, etc., polyamides, polyvinyl chloride, vinyl chloride/ vinyl acetate copolymers, ethylene/ vinyl acetate copolymer materials, ethylene / vinyl alcohol copolymer materials, polyvinyl alcohols, Vinyon etc., vinyl type polymer materials, cellulose triacetate, cellophane, etc., cellulose type resin materials, poly methyl methacrylate, polyethyl methacrylate, polyethyl acrylate, polybutyl acrylate, etc., acrylic type resins, polystyrene, polycarbonate, polyallylate, polyimide etc., synthetic resin films, or sheets, that can be a single layer materials or laminated layer materials, or it is possible to use top quality paper, thin leaf paper, sulfuric acid paper, etc., papers, etc.

Also, in order to make the separation between the release type film 11 and the adhesive agent layer 3, it is possible to apply a release type treatment. Regarding the release treatment, it can be conducted prior to the providing of the indented parts 10 on the release film 11, or it can also be provided after the indented parts 10, have been provided.

As the release treatment, for example, the method can be used where a coating material that is obtained as fluorine type resin, paraffin wax, Montana wax, synthetic wax, etc., wax type material, or silicone etc., release type agents, are added in well known vehicle materials, like for example, acrylic type resin, fiber type resin, vinyl type resin, etc., is coated on the front surface of the release film, and the coated layer of the above described coating material, is formed; a release properties possessing resin, for example, fluorine containing resin, silicone, polysiloxane, melamine type resin, urethane type resin, polyolefin resin, ionization radiation curable type poly functional acrylate, polyester, epoxy, titanium chelate, polyimine, etc., resin are coated on the surface of the release type film material, and the above resin cover layer is formed or the above described resin is laminated on the surface of the release film by the extrusion coating method, etc., and a release layer with a thickness in the range of 0.1 ~ 1 microns, is formed on the release type film material.

Regarding the coating method used for the coating of the adhesive agent on the

release film 11, there are no particular limitations, and for example, it is possible that the adhesive agent layer is formed by the roll coating, the die coating, the gravure coating, the comma method, etc., usually used coating methods. Among these methods, the after measurement method, like the comma method, is preferred because of the excellent smoothness properties of the coated surface.

The adhesive sheet according to the present invention is a material that can be manufactured as a single leaf or as a continuous roll.

In the case when the adhesive sheet is manufactured as a continuous roll type material, it is a good option any of the methods here below is used: the method where the adhesive material is coated on the release film and the substrate material is glued on, and then after that, without separating the release film, in the state as it is, it is wound in a roll form, or the method where on the back surface of the substrate material, a release treatment is conducted by using well known materials and methods, etc., and the release type film is removed, and then the adhesive sheet is wound in a roll type form.

Regarding the adhesive sheet where the release type film has been separated and it has been wound in a roll type form, it is a material where at the time of use the release type film is manually removed (there is a contradiction, probably refers to the adhesive sheet with the release film - translator's note).

#### [Effect]

In the case of the adhesive sheet 1, according to the present invention, it is a sheet that has a large number of adhesive agent protruded bodies 5, and because of that, in the case when it is adhered onto a material 9 subject to the adhesion, the contact surface area between the adhesive agent layer 3 and the material subject to the adhesion, becomes small, and the adhesive force of the adhesive sheet 1 is appropriately reduced, and the separation from the material 9 subject to the adhesion, is easily conducted.

Also, the adhesive agent protruded bodies 5 are provided so that they are protruding in an outward direction from the surface of the adhesive agent base layer 4, and by that, by the application of a light pressure, the adhesive sheet is adhered onto the material 9 subject to the adhesion, only by the adhesive agent protruded bodies 5, and because of that it is temporarily adhered, and especially, if it is pressed hard, it is adhered to the material subject to the adhesion up to the adhesive agent base layer 4, and by that it is truly adhered.

Especially, because the adhesive agent layer 3 is primed, where the adhesive agent protruded bodies 5 and the adhesive agent base layer 4, are formed as one unified body, the adhesive agent protruded bodies 5 are strongly fixed onto the substrate material 2, through the adhesive agent base layer 4, and at the time of the separation

of the adhesive sheet from the material that has been the subject of the adhesion, the adhesive agent protruded parts 5 are removed and it is said that they do not remain on the side of the material 9, that has been the subject of the adhesion.

#### **[Practical Examples]**

Here below, more detailed examples will be provided, and the present invention will be explained in more details.

#### **Practical Example 1**

On the surface of a release film, that has been manufactured from polypropylene, where on its front surface a large number of semi-spherical shape indented parts with a radius of 25 microns, have been formed by the embossing technological process, an acrylic type 2 solvent adhesive agent with a viscosity of 3000 cPa, is coated so that it fills the semi-spherically shaped indented parts and especially, it forms a thickness of 10 microns from the horizontal surface part of the film, and then after that, the adhesive agent is dried for 1 minute at a temperature of 120°C, and by that the adhesive agent layer was formed. After that, a 38 micron thick film manufactured from polyethylene terephthalate is glued onto the front surface of the above described adhesive agent layer by using a laminator, and by that the adhesive sheet was obtained.

At the time when the release film of the obtained adhesive sheet was removed and the repeat removability properties were tested, there was no adhesive agent remaining on the material that was the subject of the adhesion, and it was possible to be well separated.

#### **[Results from the present invention]**

As it has been explained in the above described, in the case of the adhesive sheet according to the present invention, it is a material where a large number of adhesive agent protruded bodies are provided so that they are protruding in the outward direction from the adhesive agent layer, and so that they form one unified body with the adhesive agent base layer, and by that, because the adhesive agent protruded bodies are strongly fixed and held to the substrate material through the adhesive agent base layer, at the time when the adhesive sheet is separated from the material that has been the subject of the adhesion, compared to the adhesive sheets according to the previous technology, it is a material where there is no remaining adhesive agent on the side of the material that has been the subject of the adhesion, and an appropriate separation can be conducted.

And especially, regarding the manufacturing method according to the present invention, it is a method where on the front surface of a release film material that has a large number of indentations, an adhesive agent is coated so that its coating



thickness is higher than the depth of the indented parts, and after that, the substrate material is glued. And because of that, compared to the manufacturing method for the preparation of adhesive sheets in the case of the previous technology, it is a simple manufacturing method, and by this method it is possible to produce an adhesive sheet material with good release properties, with high manufacturing efficiency properties and it is possible to produce a product with consistent quality.

According to the manufacturing method of the present invention, on the front surface of the release film that has indented parts, an adhesive agent is coated with a thickness that is larger than the depth of the indented parts, and by that, it is a method whereby it is possible to form together, as one body with the adhesive agent base layer, adhesive agent protruded bodies that are protruding in the outward direction from the front surface of the adhesive agent base layer. And because of that the technological process for the formation of the adhesive agent protruded bodies as a separate body, becomes unnecessary, and the shape of the obtained protruded bodies is also even, and the the productivity properties, the product quality consistency properties are improved.

Especially, because a release film is used that has indented parts, by changing the shape of the release film, it is possible to vary the shape of the adhesive agent protruded bodies, and because of that depending on the type etc., of the material that is being subjected to the adhesion, it is possible to easily change the release properties.

#### 4. Simple explanation of the figures

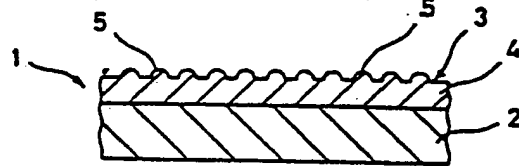
Figure 1 is a longitudinal cross sectional view diagram showing one example of the adhesive sheet according to the present invention. Figure 2 is a longitudinal sectional view diagram of an example of the use of the adhesive sheet according to the present invention. Figure 3 (a) ~ (c) is a diagram explaining the manufacturing method for the preparation of the adhesive sheet according to the present invention.

- 1.....adhesive sheet
- 2.....substrate material
- 3.....adhesive agent layer
- 4.....adhesive agent base layer
- 5.....adhesive agent protruded bodies
- 10.....indented parts
- 11.....release film

Patent Assignee: Dainippon Printing Company

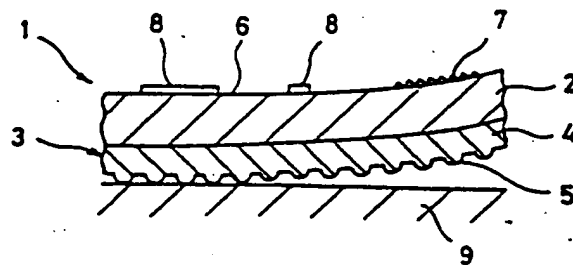
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第 1 図



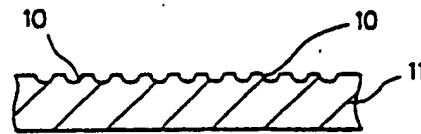
- 1…粘着シート
- 2…基材
- 3…粘着剤層
- 4…粘着剤基層
- 5…粘着剤凸状体

第 2 図



第 3 図

(a)



10…凹部  
11…絶縁フィルム

(b)



(c)

